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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,882	02/21/2002	Eric Ou-Yang	AM-3467.C1	2560
32588	7590	04/22/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			OLSEN, ALLAN W	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

myb

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/080,882		OU-YANG ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Allan Olsen		1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 and 21-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 21-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1-4, 6, 9-12 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,849,639 issued to Molloy et al (hereinafter, Molloy).**

Molloy teaches a post-etch treatment after openings have been etched in a dielectric layer. The method treats the substrate with a plasma generated from a mixture of O<sub>2</sub>, N<sub>2</sub>, and a hydrofluorocarbon. After the post-etch treatment has removed the photoresist the substrate is removed from the chamber and is cleansed with a water rinse. Molloy teaches then returning the substrate to the plasma chamber for further cleaning (removal of mobile Na<sup>+</sup> ions). See: abstract; column 4, line 28 – column 5, line 20.27

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Molloy does not teach a using a plasma with an electron density of at least  $10^{11}/\text{cm}^3$ .

It would have been obvious to one skilled in the art to use a plasma with an electron density of at least  $10^{11}/\text{cm}^3$  because Molloy teaches using a high density plasma reactor which, as evidenced by Li in 6,284,149 (col. 8, line 14-18), is considered in the art to be plasma with an electron density of at least  $10^{11} \text{ e}^-/\text{cm}^3$ .

**Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,082,374, issued to Huffman et al. (hereinafter, Huffman).**

Huffman teaches a post via etching treatment that removes photoresist.

The method comprises contacting the substrate with a plasma generated from a mixture of  $\text{O}_2$ ,  $\text{N}_2$ ,  $\text{H}_2$ , and a fluorine source such as  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_8$ ,  $\text{CHF}_3$  or  $\text{CFH}_3$ . Huffman teaches using oxygen at each step of a multi-step process. Huffman teaches using oxygen flow rates ranging from 200 sccm to 4000 sccm. These flow rates provide for the medium flow oxygen plasma and high flow oxygen plasma. A 60 second treatment using a mixture as described above is carried out after a preliminary stage involving a high flow rate (~2000 sccm) oxygen plasma which corresponds to the oxygen flushing limitation of claims 7 and 8. A third plasma step using 200-4000 sccm of oxygen (i.e. medium to high flow rate) cleans the substrate within the chamber. The substrate is cleaned further with a water rinse after being removed from the chamber. See: column 3, lines 23-43; column 4, lines 56-61; column 5, lines 11-18, 33-67; column 6, lines 1-4, 30-47.

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Huffman does not teach a using a plasma with an electron density of at least  $10^{11}/\text{cm}^3$ . It would have been obvious to one skilled in the art to use a plasma with an electron density of at least  $10^{11}\text{cm}^{-3}$  because Huffman teaches that any plasma apparatus may be used and it is well known that a high density plasma provides advantages, such as an increase in processing rate (higher throughput) and generally provides wider processing windows to a fabrication process thereby providing a higher degree of process control.

### ***Response to Arguments***

Applicant's arguments filed February 9, 2004 have been fully considered but they are not persuasive.

In regard to Huffman, Applicant argues that Huffman does not teach the claimed plasma density. Applicant also argues that the skilled artisan would not be motivated to use a high density plasma because Huffman teaches using a chamber pressure that ranges from about 0.5 Torr to about 10 Torr which is too high of a pressure to sustain a high density plasma.

The examiner notes that Huffman teaches at column 6, lines 11-13 that the chamber pressure may be as low as a few mTorr.

Applicant also argues that one of Huffman's stated goals is to remove residual photoresist and other material from a substrate while maintaining minimum oxide loss, whereas Applicant's invention is called upon to remove oxide residue.

The examiner notes that Huffman teaches the removing residues post via etch and oxide etch.

With regard to Molloy, Applicant argues that Molloy teaches rinsing the substrate with water whereas Applicant's invention is a dry plasma process.

The examiner notes that Molloy's plasma process is also dry and that Applicant's claims do not exclude a rinsing step following the dry plasma process.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

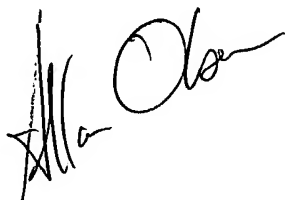
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M-F 1-5.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Allan Olsen', is written over a horizontal line.

Allan Olsen  
Primary Examiner  
Art Unit 1763